



PRESENTATION TITLE

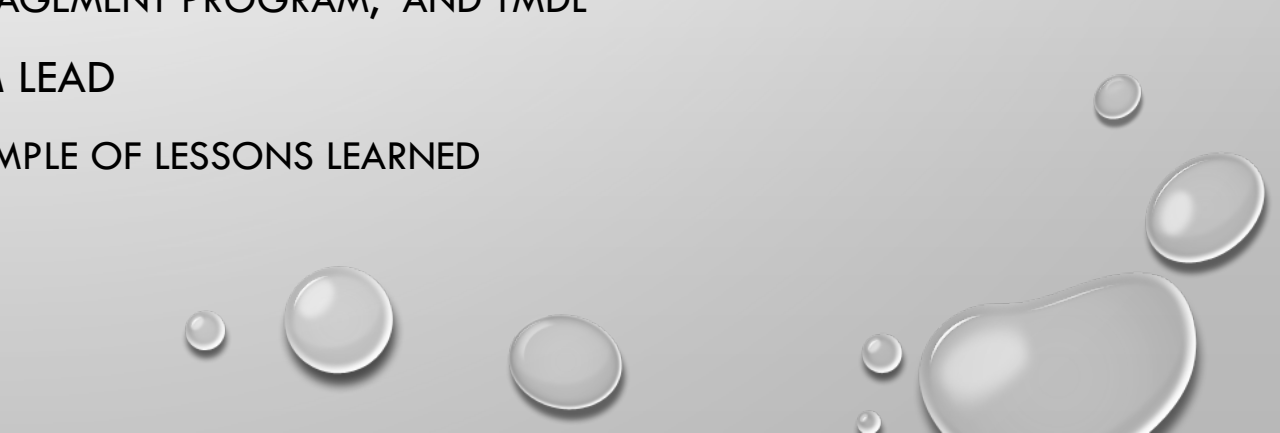
OVERVIEW OF LAKE WHATCOM SW PROGRAM

- QUESTIONS
 - ARE WE DOING ENOUGH TO MEET OUR 50 YEAR COMMITMENT?
 - ARE WE GETTING BANG FOR THE BUCK FROM OUR PROGRAMS AND PROJECTS?
 - IS THE LAKE WHATCOM STORMWATER UTILITY BEING MANAGED AND IS IT FUNCTIONING AS INTENDED?
- 



PRESENTATION TITLE

OVERVIEW OF LAKE WHATCOM SW PROGRAM

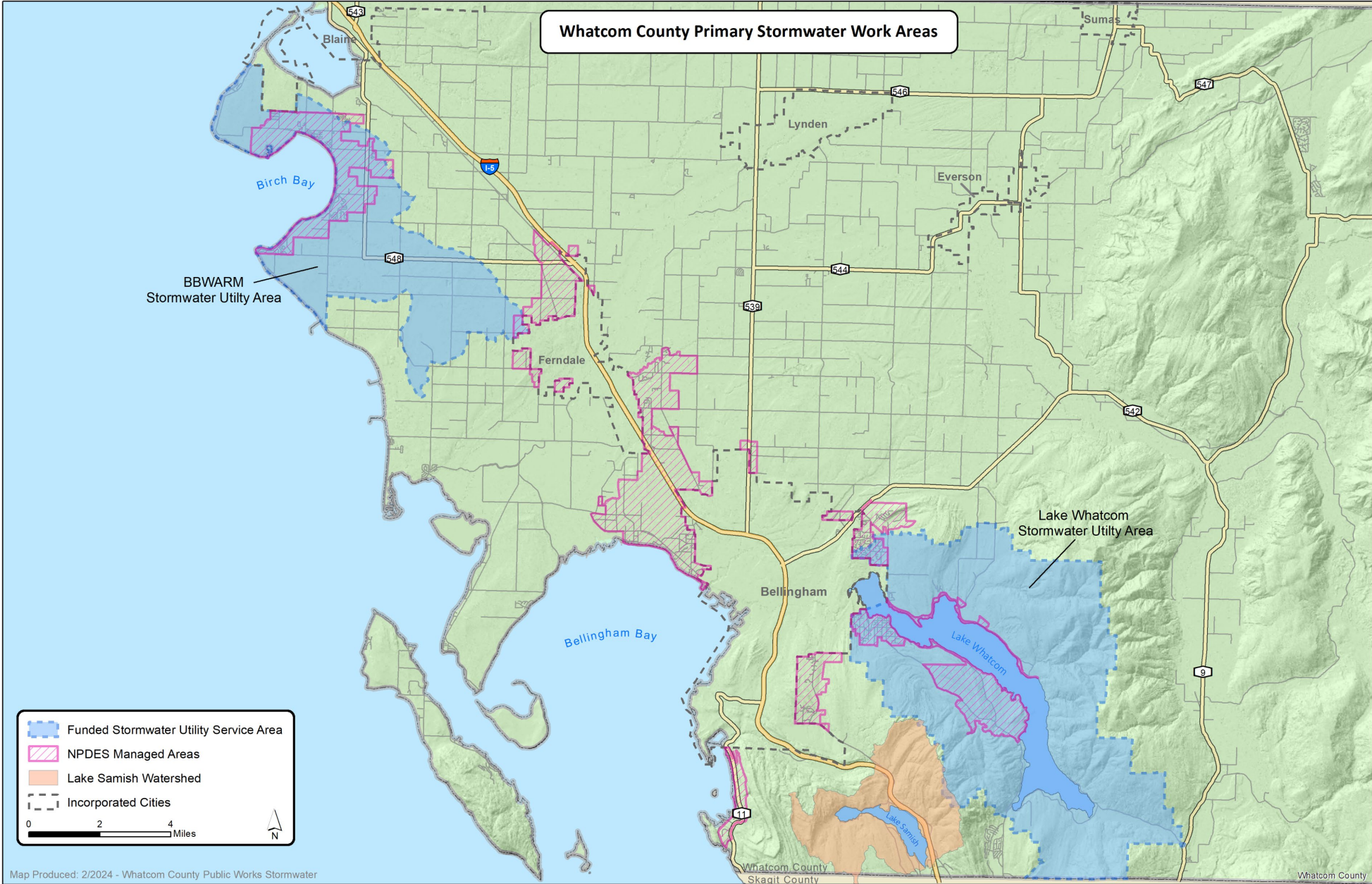
- PRESENTERS
 - **KRAIG OLASON**, DIVISION MANAGER –
 - OVERVIEW OF DIVISIONS PROGRAMS, FUNDING AND RELATIONSHIP TO INTENDED USE OF THE STORMWATER UTILITY
 - PRESENTATION SUMMARY
 - **CATHY CRAVER**, SENIOR PLANNER, NPDES LEAD
 - OVERVIEW AND BACKGROUND ON LAKE MANAGEMENT PROGRAM, AND TMDL
 - **CODY SWAN**, ENGINEER 3, CAPITAL PROGRAM LEAD
 - RECAP OF CAPITAL PROGRAM AND SOME EXAMPLE OF LESSONS LEARNED
- 



STORMWATER DIVISION PROGRAM

- STORMWATER DIVISION PROGRAM ACTIVITIES OCCUR PRIMARILY IN NPDES AREA, BBWARM DISTRICT AREA AND LAKE WHATCOM.
 - PROGRAM AREAS INCLUDE:
 - EDUCATION AND OUTREACH
 - CAPITAL PROJECT
 - MAINTENANCE AND SMALL WORKS PROJECTS
 - NEIGHBORHOOD NATIVE LANDSCAPE PROGRAM (FORMERLY HOMEOWNER INCENTIVE PROGRAM)
 - MONITORING AND SAMPLING
 - PLANS AND STUDIES
 - GENERAL ADMINISTRATION
- 

STORM WATER DIVISION FOCUS AREAS



STORMWATER DIVISION PROGRAM

- NPDES PHASE 2 PERMIT - PROVIDES THE STRUCTURE TO SW DIVISION PROGRAMS.
- NPDES PERMIT FRAMEWORK WAS USED TO DEVELOP EACH OF THE 3 COMPREHENSIVE STORMWATER PLANS
 - BIRCH BAY – 2006 BBWARM (SW UTILITY)
 - LAKE WHATCOM – 2008 LAKE WHATCOM STORMWATER COMP PLAN, NOW A UTILITY
 - LAKE SAMISH BASIN – 2012 DID NOT FORM A STORMWATER UTILITY
- THE COMPREHENSIVE STORMWATER PLANS PROVIDE DIRECTION FOR SW PROGRAMS

STORMWATER DIVISION PROGRAM

EXAMPLES OF TYPICAL FUNDING ARRANGEMENT

Program	Target Area(s)	Funded by	Notes
Education Outreach	NPDES Phase 2, BBWARM, LWSU, LSB	Road, BBWARM, LWSU, Grants	NPDES provides basic funding, each utility pays for utility specific programs – newsletters, events etc.
Capital projects	BBWARM, LWSU - other	BBWARM, LWSU, REET, Road, grants	Projects paid by each utility. Currently SW is not funded to carryout retrofits beyond utility areas.
Small Works Projects	NPDES permit area and SW Utilities	Road, BBWARM, LWSU	NPDES required projects are paid with Road funds, others are paid by BBWARM or LWSU
Maint & Operations	NPDES area	Road, BBWARM,LWSU	General repair and maintenance is funded by Road Water quality facility maintenance and repair is covered by each utility

LAKE WHATCOM STORMWATER UTILITY

STORMWATER UTILITY EXPENDITURES 2023 AS A PERCENT OF ESTIMATED
TOTAL LAKE WHATCOM MANAGEMENT PROGRAM COSTS

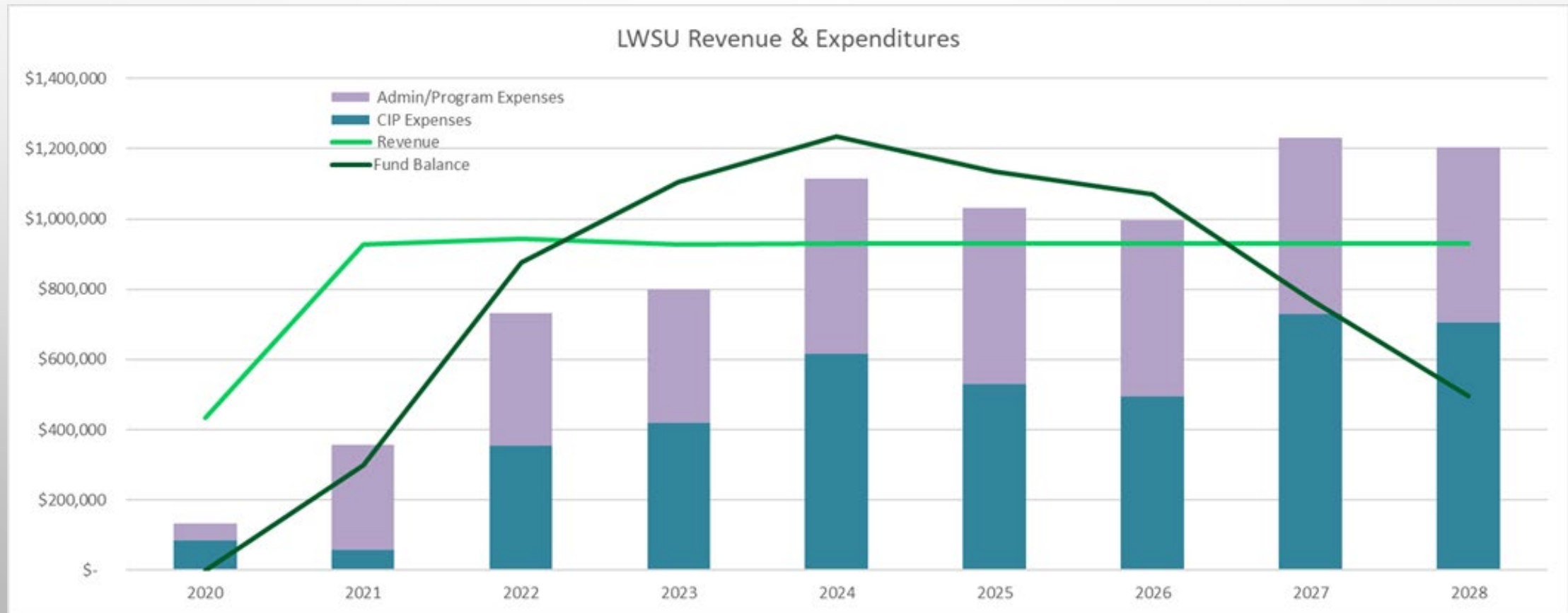
Actual funding breakdown in 2023			
	Funding Source	Annual costs	Percent
	LWSU	\$ 341,963	13%
	Grants	\$ 740,000	28%
	Road	\$ 386,200	14%
	REET	\$ 517,862	19%
	FCZD	\$ 434,446	16%
	General Fund	\$ 270,000	10%
Total for Lake Whatcom Program		\$ 2,690,471	100%

LAKE WHATCOM STORMWATER UTILITY

STORMWATER UTILITY EXPENDITURES 2023 BY PROGRAM AREA

2023 LWSU Program Areas	Total	Percent
Administration & Program Management	\$82,143.01	10.8%
Capital Improvement Projects	\$423,210.65	55.5%
Maintenance & Small Works	\$111,061.31	14.6%
Monitoring, Reports & Studies	\$11,840.35	1.6%
Enhanced Education & Outreach	\$35,461.28	4.7%
Private Property Improvements - HIP & NNLP	\$98,245.95	12.9%
Total	\$761,962.55	100%

LAKE WHATCOM STORMWATER UTILITY

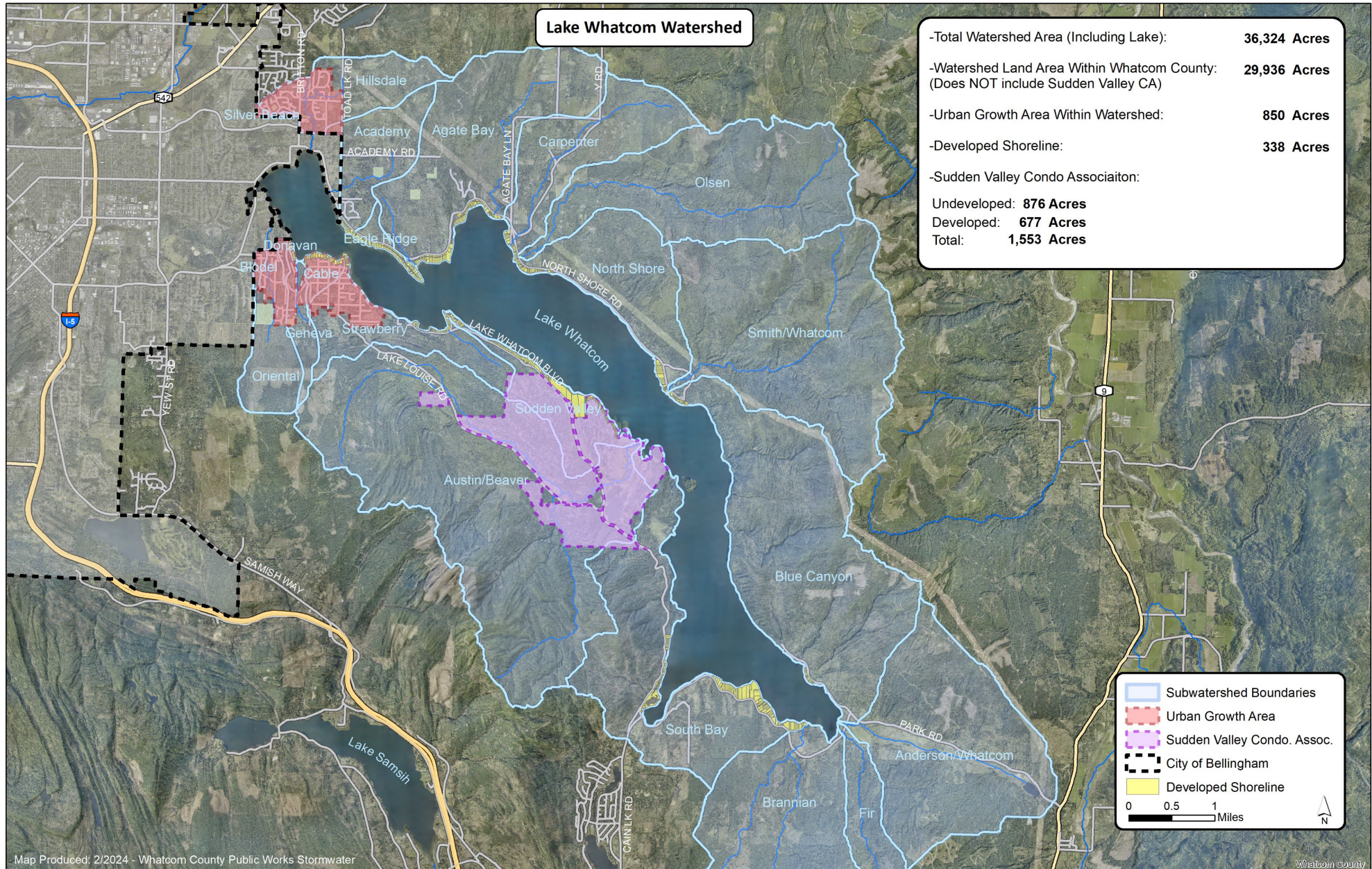


LAKE WHATCOM STORMWATER UTILITY

- FUNDS USED TO INCREASE NUMBER OF CAPITAL PROJECTS

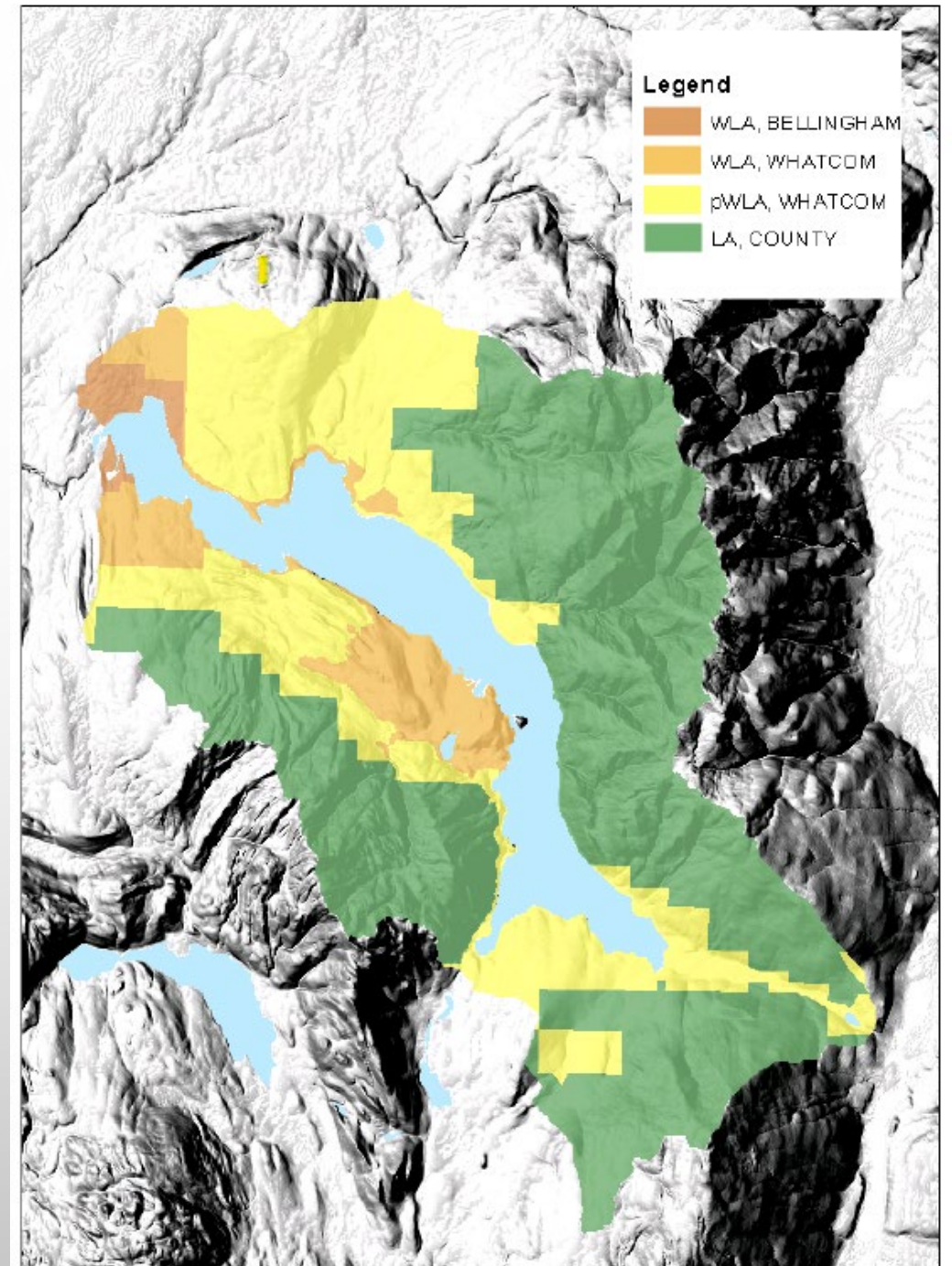
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U			
Item No.	Project Description	Database ID No.	BES	Previous Expenditures		2024			2025			2026			2027			2028					
				Amount	Source	Phase	Amount	Source	Phase	Amount	Source	Phase	Amount	Source	Phase	Amount	Source	Phase	Amount	Source			
LAKE WHATCOM STORMWATER																							
1	SWP #SWLW23-04 Academy Road Stormwater Improvements: Evaluate the water quality performance of the existing Academy stormwater system and provide recommended retrofits.	20-005	63.9	\$ 1,935,000	REET / LWSU	PE	\$ 25,000	LWSU	PE			PE			PE			PE					
						RW			RW			RW			RW			RW					
						CN			CN	\$ 70,000	LWSU	CN			CN			CN			CN		
2	SWP #SWLW23-03 Geneva Bioretention Pilot Project: Install new water quality treatment media, evaluate the effectiveness and constructability of new water quality treatment media	20-006	63.9	\$ 1,000,000	REET/Grant/LWSU	PE			PE			PE			PE			PE					
						RW			RW			RW			RW			RW					
						CN	\$ 90,000	ECY Grant	CN			CN			CN			CN			CN		
3	SWP #SWLW23-01 Silver Beach Creek Stormwater Improvements Phase 2: Main channel restoration below Hillsdale using natural vegetation	07-095	60.5	\$ 250,000	REET / LWSU	PE	\$ 40,000	LWSU	PE			PE			PE			PE					
						RW	\$ 20,000	REET	RW			RW			RW			RW					
						CN	\$ 600,000	REET	CN			CN			CN			CN			CN		
						CN	\$ 250,000	LWSU	CN			CN			CN			CN			CN		
4	Eagleridge Stormwater Improvements: Install a water quality system to treat stormwater from the Eagleridge development.	20-007	61.4	\$ 15,000	LWSU	PE	\$ 280,000	REET	PE			PE			PE			PE					
						RW	\$ 15,000	LWSU	RW			RW			RW			RW			RW		
						CN			CN	\$ 500,000	LWSU	CN			CN			CN			CN		
5	Austin Court Stormwater Improvements: Install water quality system on the discharge from Austin Court.	20-008	58.8			PE	\$ 200,000	LWSU	PE			PE			PE			PE					
						RW	\$ 25,000	REET	RW			RW	\$ 450,000	LWSU	RW			RW			RW		
6	SWP #SWLW23-05 Cedar Hills Culvert Replacement: Replacement of culvert damaged during the 2021 flooding event with FEMA funding contribution.	23-001	44.2	\$ 12,000	LWSU	PE	\$ 60,000	FEMA	PE			PE			PE			PE					
						PE	\$ 100,000	REET	PE			PE			PE			PE					
						RW	\$ 15,000	LWSU	RW			RW			RW			RW			RW		
						CN			CN	\$ 180,000	FEMA	CN			CN			CN			CN		
						CN			CN	\$ 25,000	REET	CN			CN			CN					

LAKE WHATCOM



LAKE WHATCOM TOTAL MAXIMUM DAILY LOAD (TMDL)

- 1998 LISTED ON EPA'S 303(D) LIST AS AN IMPAIRED WATER BODY OF THE STATE.
- 2016: FINAL TMDL ADOPTED WITH THE GOAL TO MEET WATER QUALITY STANDARD FOR DISSOLVED OXYGEN IN THE LAKE.
- ADDITIONAL PHOSPHORUS ATTRIBUTED BY DEVELOPMENT IDENTIFIED AS KEY CONTRIBUTOR LOWERING DISSOLVED OXYGEN LEVELS IN LAKE.
- TMDL SEPARATES COMMERCIAL FORESTRY FROM OTHER ZONING. IN TMDL, COMMERCIAL FORESTRY "ASSIGNED" AS NATURAL LOAD FROM FORESTS, AND IS NOT ALLOCATED TO COB OR WC TO ADDRESS.
- 50-YEAR TIMEFRAME TO FORECAST ACTIONS TO HELP BRING DISSOLVE OXYGEN LEVELS BACK TO WATER QUALITY STANDARDS.
 - JURISDICTIONS ESTABLISH 5 AND 10 YEAR MILESTONES AND UTILIZE ADAPTIVE MANAGEMENT TO TRACK PROGRESS.

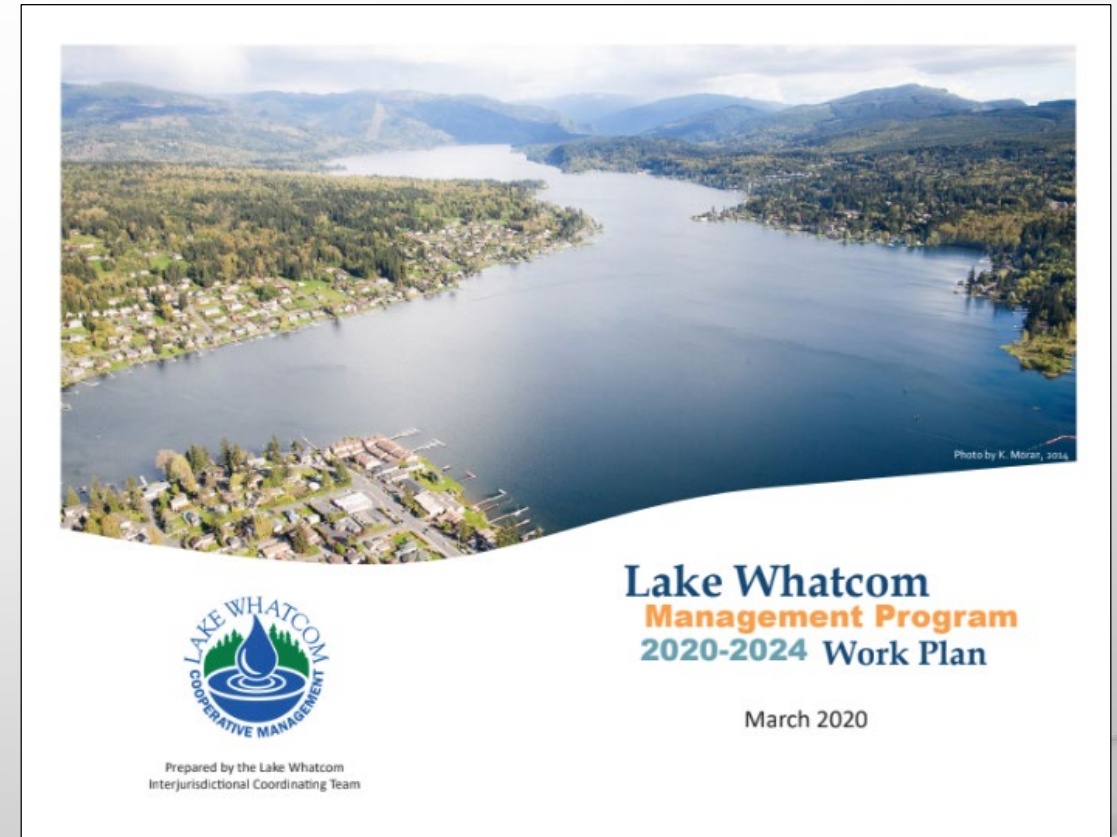


LAKE WHATCOM MODELING AND MONITORING

- ONGOING LAKE MONITORING AND TRIBUTARY WITH THE INSTITUTE FOR WATERSHED STUDIES.
- 2016: CITY OF BELLINGHAM UPDATED LAKE LOADING MODEL (HFAM).
- 2007-2020: LAKE WHATCOM TRIBUTARY MONITORING PROGRAM WITH BROWN AND CALDWELL. (JOINT EFFORT BETWEEN CITY OF BELLINGHAM, WHATCOM COUNTY, AND LAKE WHATCOM WATER AND SEWER DISTRICT.)
- 2020: WHATCOM COUNTY INITIATED UPDATE OF CE-QUAL W2 LAKE RESPONSE MODEL AND LAKE WHATCOM TMDL REASSESSMENT PROJECT.
 - CE-QUAL W2 UTILIZES UPDATED LOADING DATA TO MODEL DISSOLVED OXYGEN LEVELS IN LAKE WHATCOM IN ORDER TO MEET STATE WATER QUALITY STANDARDS.
- ONGOING EFFECTIVENESS MONITORING OF STORMWATER FACILITIES AND MEDIA.
- ONGOING IDENTIFICATION OF ADDITIONAL STUDIES TO REDUCE UNCERTAINTY IN MODELS.

LAKE WHATCOM MANAGEMENT PLAN (LWMP) & LAKE WHATCOM TMDL-APPENDIX 2 REPORTING

- 1992 CITY OF BELLINGHAM, WHATCOM COUNTY AND THE LAKE WHATCOM WATER AND SEWER DISTRICT ESTABLISHED FOUNDATION FOR LAKE PROTECTION. FOLLOWED BY 1998 PROGRAM INCEPTION.
 - FIRST WORK PLAN (1-YEAR) 1999, FOLLOWED UP WITH 5-YEAR WORK PLANS (5 PLANS TO DATE)
- ANNUAL REPORTING OF ALL LAKE WHATCOM ACTIVITIES AT THE JOINT COUNCILS AND COMMISSIONERS MEETING. (MARCH 27TH)
- REQUIRED ANNUAL REPORTING OF APPENDIX 2 TASKS AS PART OF THE WESTERN WASHINGTON PHASE II MUNICIPAL STORMWATER PERMIT. (5 & 10 YEAR MILESTONES REPORTED)

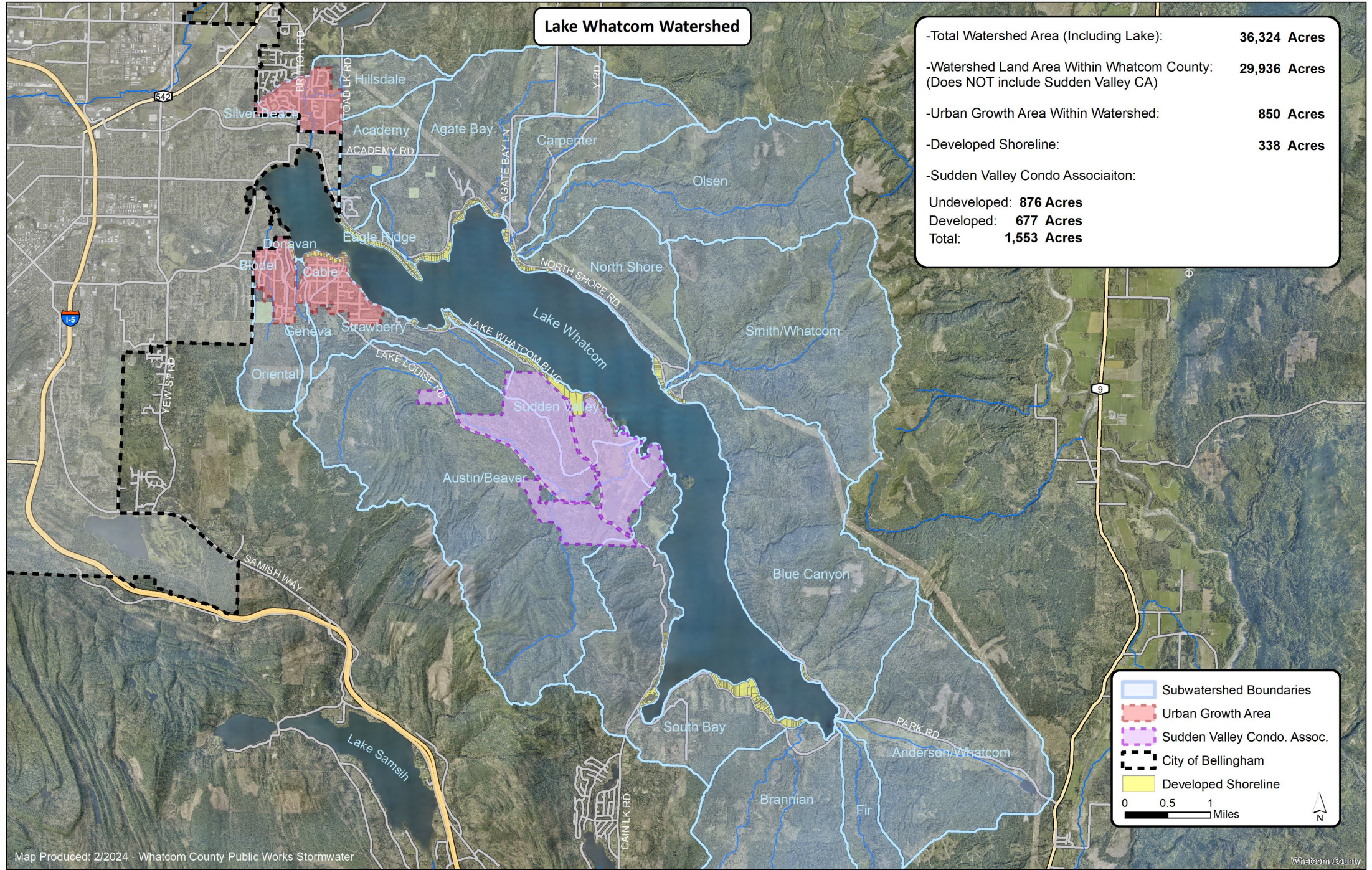


KEY LAKE MANAGEMENT ACTIONS TAKEN WITHIN WHATCOM COUNTY (NON-CAPITAL)

- 1993: SUDDEN VALLEY COMMUNITY ASSOCIATION INITIATED A DENSITY REDUCTION PROGRAM REMOVING DEVELOPABLE LOTS (APPROX. 1,400 UNITS)
- 1999: ENHANCED DEVELOPMENT STANDARDS; WITH MULTIPLE AMENDMENTS UNTIL 2013 WITH WCC 20.50 LAKE WHATCOM WATERSHED OVERLAY
- 2002: SEASONAL CLEARING THRESHOLDS
- 2002-2004: COUNTY-CITY-DISTRICT ACQUIRED PERMANENT RESTRICTIVE COVENANTS ACROSS SUDDEN VALLEY (OVER 300 UNITS)
- 2004: DOWNZONE OF PROPERTIES SUBDIVIDED INTO LESS THAN 5 ACRE PARCELS IN 2003 (APPROX. 1,800 UNITS)
- 2004: DNR LAKE WHATCOM LANDSCAPE PLAN
- 2013: ADOPTION OF THE WCC 20.51 LAKE WHATCOM WATERSHED OVERLAY
- 2014: LAKE WHATCOM LAND RECONVEYANCE (APPROXIMATELY 8,800 ACRES)
- 2014: ENHANCED STREET SWEEPING IN LAKE WHATCOM WATERSHED (REMOVES APPROX. 30 LBS OF PHOSPHORUS ANNUALLY)
- 2016: SUDDEN VALLEY STORMWATER MANAGEMENT AND PHOSPHORUS MITIGATION PLAN
- 2016: TMDL ADOPTED
- 2016: WHATCOM COUNTY ADOPTED ACCELERATED INSPECTION AND CLEANING SCHEDULES FOR CATCH BASINS
- ONGOING EDUCATION AND OUTREACH (PET WASTE, YARD WASTE, NEIGHBORHOOD NATIVE LANDSCAPING PROGRAM, ETC.)

Lake Whatcom Watershed

-Total Watershed Area (Including Lake):	36,324 Acres
-Watershed Land Area Within Whatcom County: (Does NOT include Sudden Valley CA)	29,936 Acres
-Urban Growth Area Within Watershed:	850 Acres
-Developed Shoreline:	338 Acres
-Sudden Valley Condo Association:	
Undeveloped:	876 Acres
Developed:	677 Acres
Total:	1,553 Acres



Subwatershed Boundaries

Urban Growth Area

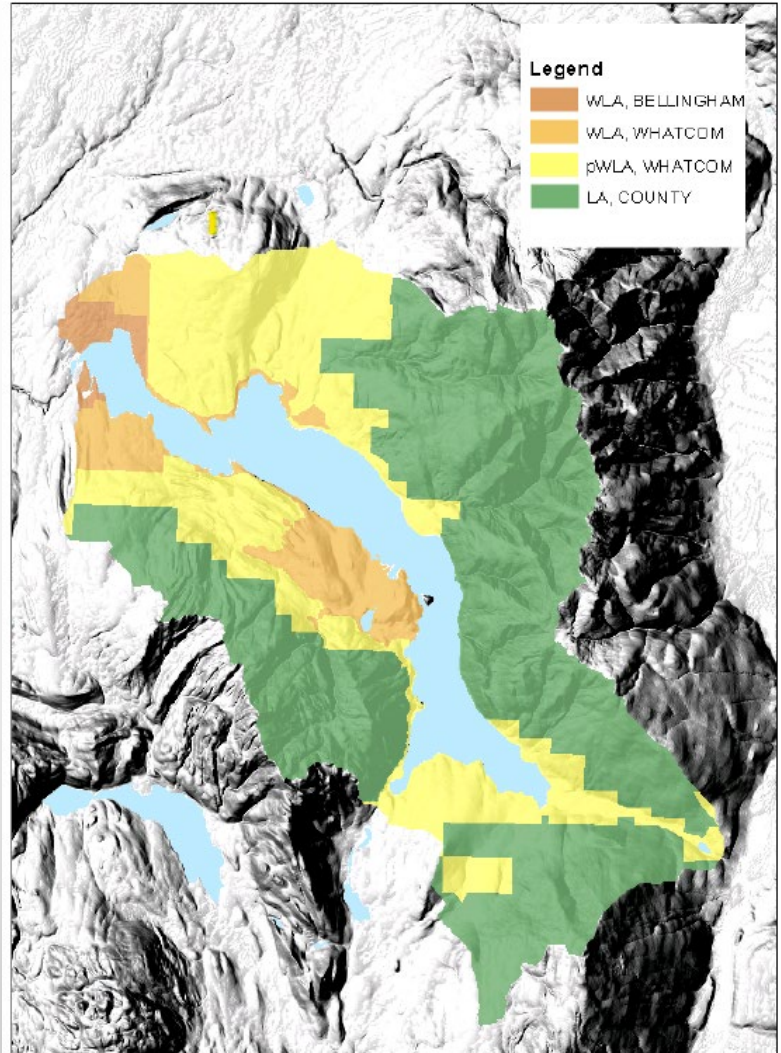
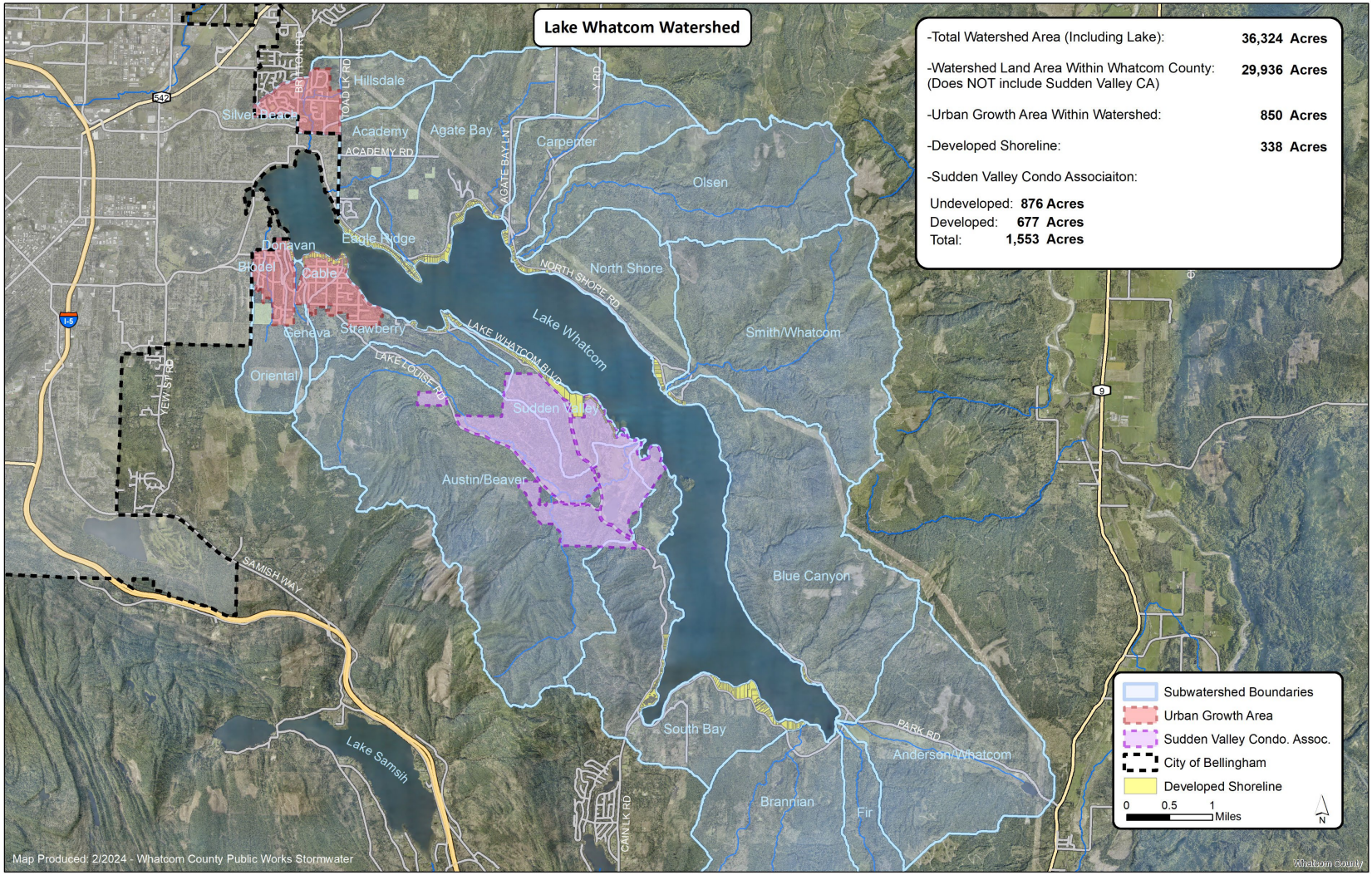
Sudden Valley Condo. Assoc.

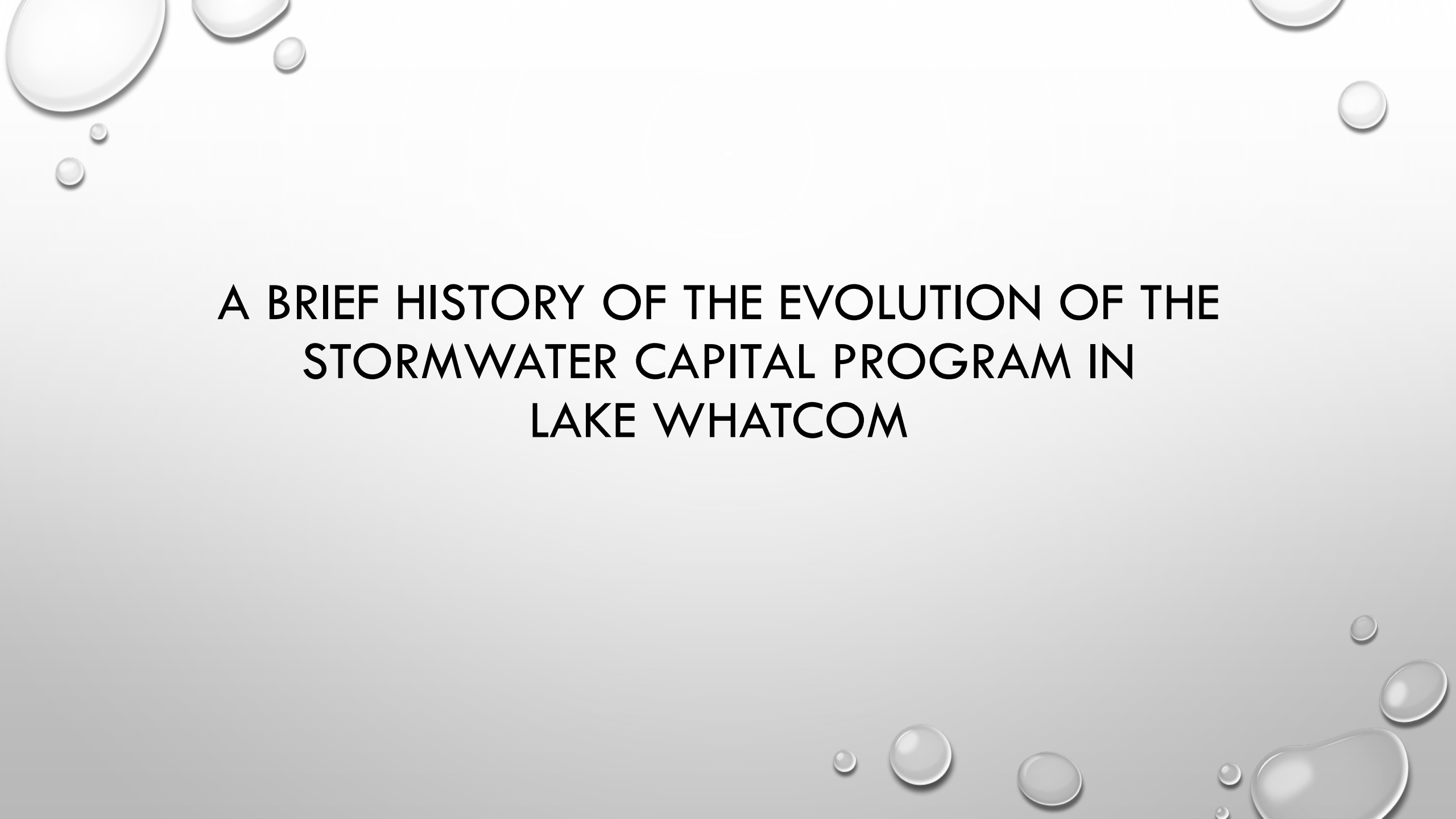
City of Bellingham

Developed Shoreline

0 0.5 1 Miles

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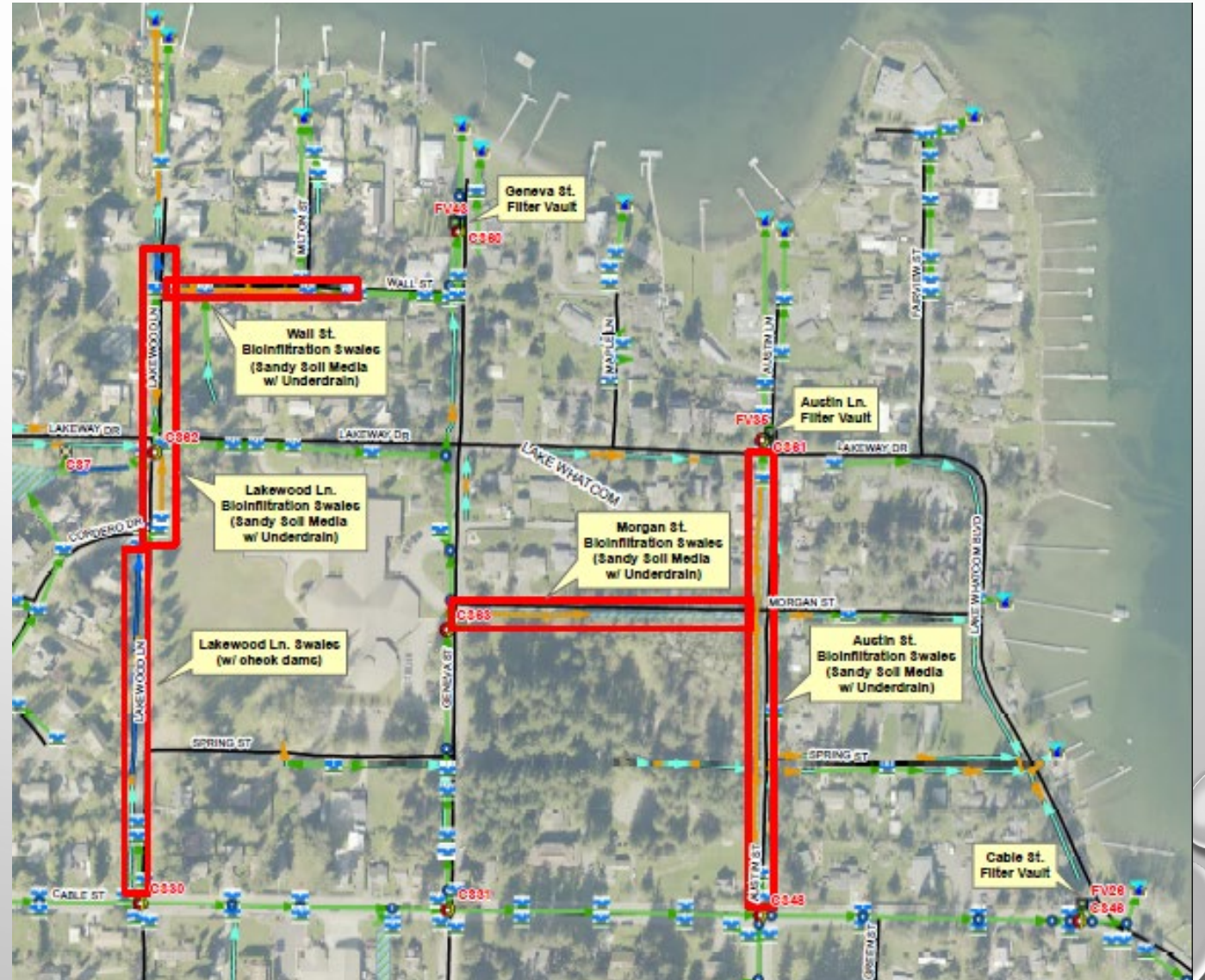


The background of the slide is a light gray gradient. It is decorated with several realistic water droplets of various sizes. In the top-left corner, there is a large droplet and a few smaller ones. In the top-right corner, there is a single medium-sized droplet. In the bottom-right corner, there is a cluster of droplets, including a large one and several smaller ones. In the bottom-center, there are a few more small droplets.

A BRIEF HISTORY OF THE EVOLUTION OF THE STORMWATER CAPITAL PROGRAM IN LAKE WHATCOM

EARLY DAYS OF STORMWATER PROJECT DEVELOPMENT

- PROJECT WERE LOCATED IN THE GENEVA AREA
- THE PROJECTS FOCUS ON INFILTRATION USING BIOINFILTRATION SWALES
- TREATMENT FOR WATER QUALITY WAS PROVIDED THROUGH
 - BIOINFILTRATION SWALES
 - END OF THE LINE TREATMENT VIA STORMFILTER FAULTS



LK WHATCOM COMP. PLAN (CH2M HILL 2008)

(COUNCIL APPROVED 2008)

Water Quality and Phosphorus

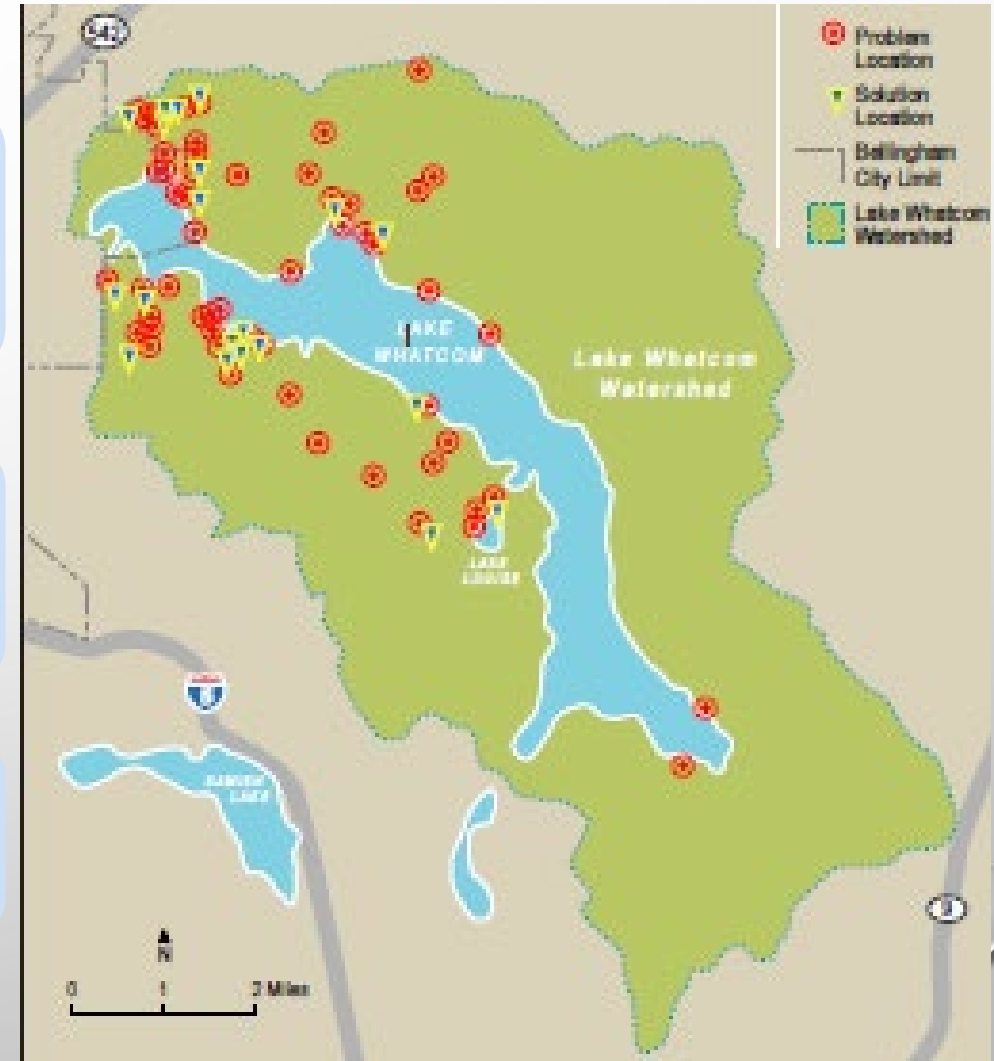
- Control erosion in ditches and creeks, on already developed property and construction sites
- Reduce stormwater runoff volumes and velocities
- Infiltrate stormwater to provide natural treatment
- Provide source control

Water Quantity

- Infiltrate rainfall on-site
- Minimize peak flows
- Control runoff volumes

Aquatic Habitat

- Stabilize stream channels
- Re-vegetate degraded riparian corridors



PROJECTS COMPLETED: LK WHATCOM COMP. PLAN (CH2M HILL 2008)

2005 & 2012 DOE MANUAL USED FOR DESIGN OF BMPS

2010 LAHTI DRIVE

- BIO-INFILTRATION SWALE

2011-2012 SILVER BEACH CREEK

- BIO-INFILTRATION SWALE & STORMFILTER CARTRIDGE VAULT (EMERGING TECHNOLOGY)

2013-2014 CORONADO-FREMONT PHASE 1&2

- PHASE 1 - BIO-INFILTRATION SWALE & STORMFILTER CARTRIDGE VAULT (EMERGING TECHNOLOGY)
- PHASE 2 – SETTLING POOLS (FLOW MGMT.) W/ STORMFILTER CARTRIDGE VAULT (EMERGING TECHNOLOGY)



WATER RESOURCE IMPROVEMENT PLAN (WRIP)

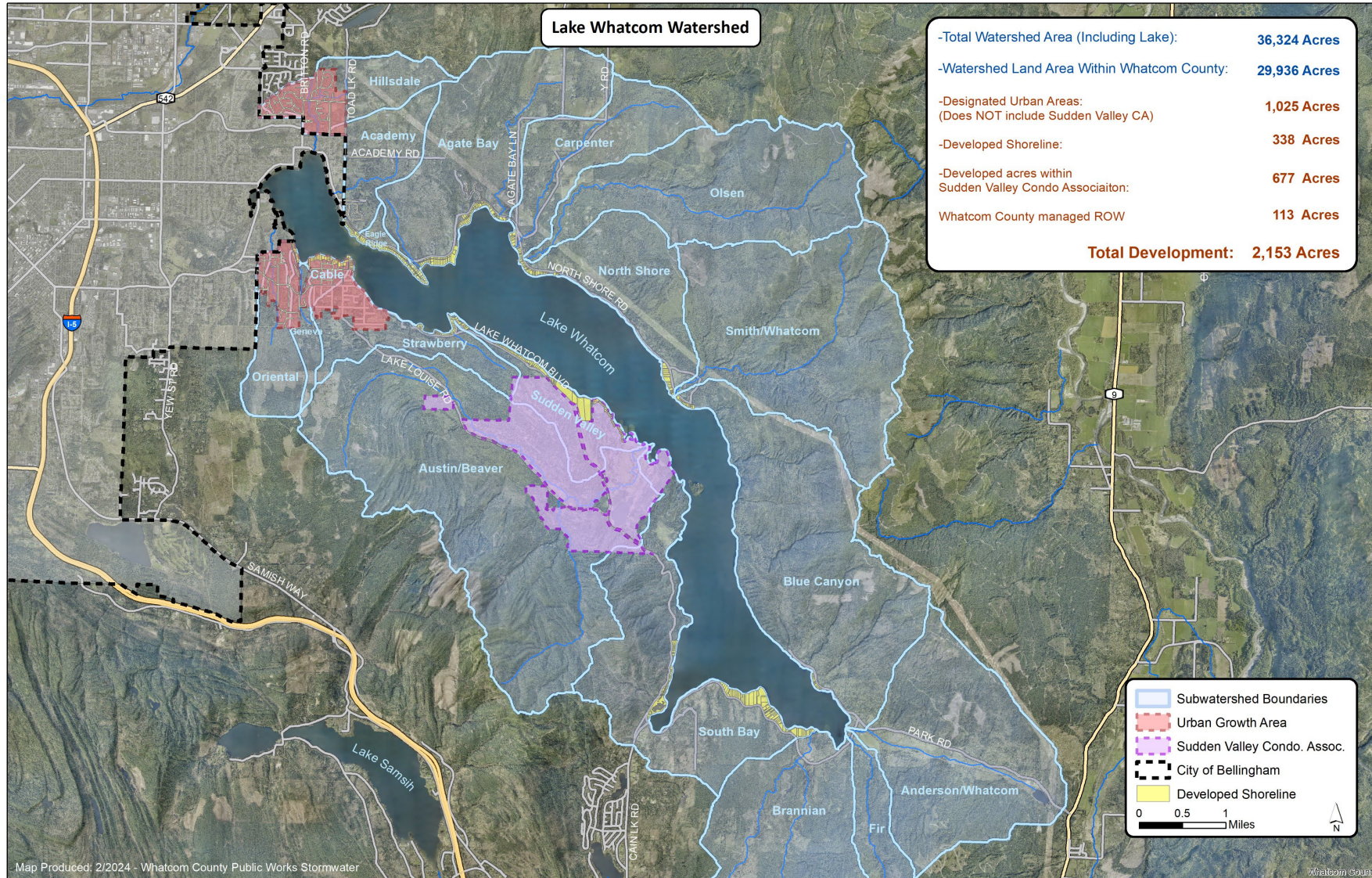
(COUNCIL APPROVAL 2014)

- BEGINS PROGRAMMING OF CAPITAL PROJECTS FORECASTING 6 SIX YEARS OUT.
- BUDGETS FOR ACCOMPLISHMENT OF THESE TASKS.
- MECHANISM TO CONVEY THE PLAN TO COUNCIL AND THE COMMUNITY.

No.	Project Description	Database ID No.	BES	Previous expenditures		2024		2025		2026		2027		2028		2029		Total	
				Amount	Source	Phase	Amount	Source	Phase	Amount	Source	Phase	Amount	Source	Phase	Amount	Source		Phase
LAKE WHATCOM STORMWATER																			
1	SWP #SWLW23-04 Academy Road Stormwater Improvements: Evaluate the water quality performance of the existing Academy stormwater system and provide recommended retrofits.	20-005	63.9	\$ 1,935,000	REET / LWSU	PE	\$ 25,000	LWSU	PE			PE			PE			\$ 2,030,000	
						RW			RW			RW			RW				
						CN			CN			CN			CN				
2	SWP #SWLW23-03 Geneva Bioretention Pilot Project: Install new water quality treatment media, evaluate the effectiveness and constructability of new water quality treatment media	20-006	63.9	\$ 1,000,000	REET/Grant/LWSU	PE			PE			PE			PE			\$ 1,112,000	
						RW			RW			RW			RW				
						CN	\$ 90,000	ECY Grant	CN			CN			CN				
3	SWP #SWLW23-01 Silver Beach Creek Stormwater Improvements Phase 2: Main channel restoration below Hillsdale using natural vegetation	07-095	60.5	\$ 250,000	REET / LWSU	PE	\$ 40,000	LWSU	PE			PE			PE			\$ 1,160,000	
						RW	\$ 20,000	REET	RW			RW			RW				
						CN	\$ 600,000	REET	CN			CN			CN				
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						RW	\$ 15,000	LWSU	RW			RW			RW				
						CN			CN	\$ 500,000	LWSU	CN			CN				
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						RW	\$ 25,000	REET	RW			RW			RW				
						CN			CN			CN	\$ 450,000	LWSU	CN				
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						PE	\$ 100,000	REET	PE			PE			PE				
						RW	\$ 15,000	LWSU	RW			RW			RW				
						CN			CN	\$ 180,000	FEMA	CN			CN				
						CN			CN	\$ 25,000	REET	CN			CN				

ADOPTION OF THE TMDL

(APRIL 2016)



- DEFINES A TARGET GOAL FOR PHOSPHORUS REDUCTION IN THE WATERSHED.
- IT IS A COLLABORATION WITH THE CITY AND LK. WHATCOM WATER AND SEWER TO IMPROVE WATER QUALITY.
- THE ACADEMY ROAD PROJECT IS COMPLETE THROUGH THE COLLABORATION BETWEEN THE COUNTY AND THE CITY.

LK WHATCOM COMP. PLAN: STORMWATER CAPITAL PROGRAM UPDATE (HERRERA 2017) (COUNCIL APPROVAL NOV. 2017)

- COLLECT INFORMATION FROM THE PUBLIC AND LAKE WHATCOM MANAGEMENT PROGRAM PARTNERS ON KNOWN DRAINAGE PROBLEMS AND POSSIBLE WATER QUALITY TREATMENT PROJECTS.
- EVALUATE AND PRIORITIZE PROPOSED PROJECTS BASED ON PRELIMINARY COST ESTIMATES AND ESTIMATED PHOSPHORUS LOAD REDUCTION.
- CONCEPTUAL ENGINEERING ANALYSIS TO IDENTIFY AND SCOPE NEW CAPITAL PROJECTS.
- DEVELOP CONCEPTUAL DESIGNS FOR PRIORITY CAPITAL PROJECTS.

LAKE WHATCOM COMPREHENSIVE PLAN: STORMWATER CAPITAL PROGRAM UPDATE

WHATCOM COUNTY, WASHINGTON



**PREPARED FOR
WHATCOM COUNTY PUBLIC WORKS**

Prepared by
Herrera Environmental Consultants, Inc.

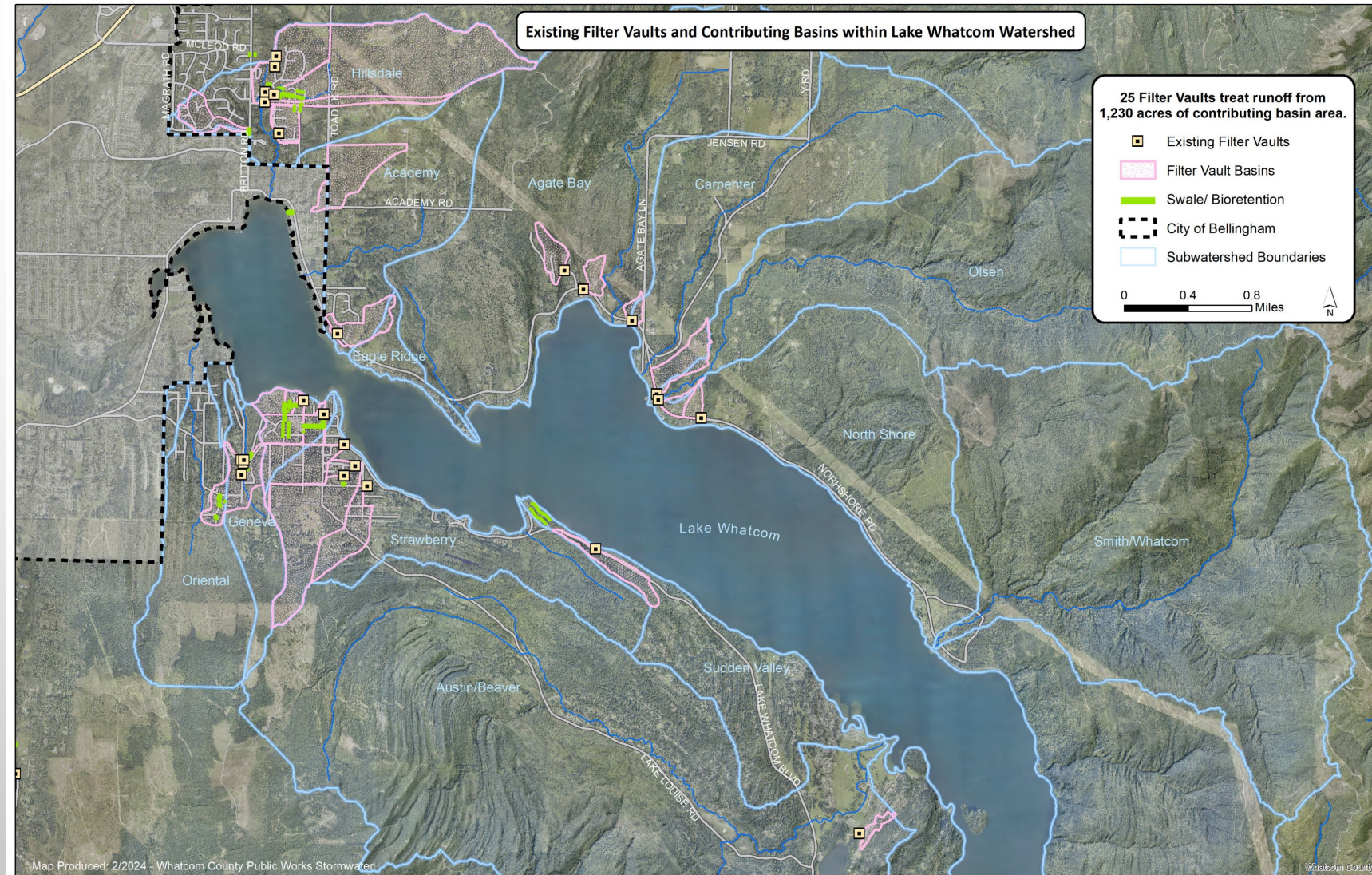


PROJECTS COMPLETED: LK WHATCOM COMP. PLAN: STORMWATER CAPITAL PROGRAM UPDATE(HERRERA 2017)

2012 W/ 2014 AMENDMENT & 2019 DOE MANUAL USED FOR DESIGN OF BMPS

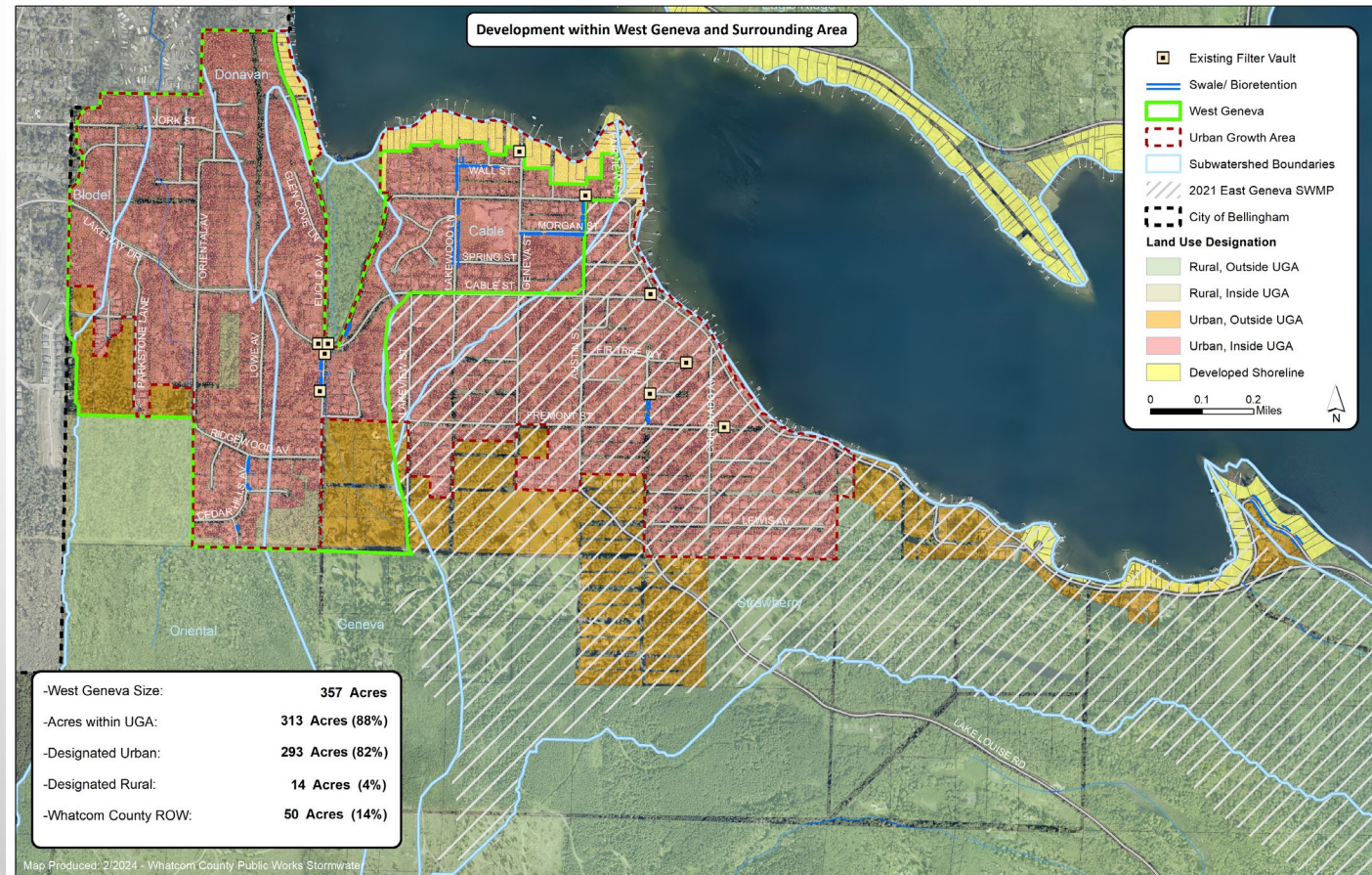
PROJECTS

- 2016 CEDAR HILLS EUCLID
 - COMBINATION OF BIORETENTION SWALES AND STORMFILTER CARTRIDGE VAULT
- 2018-2019 AGATE PHASE 1&2
 - RETROFIT DEVELOPMENT WITH STORMFILTER CARTRIDGE VAULT
- 2020 NORTHSORE/EDGEWATER
 - STORMFILTER CARTRIDGE VAULT
- 2021 SILVER BEACH CREEK PHASE 1
 - RETROFITING MODULAR WETLAND PRIVATE DETENTION POND AND THE EXISTING OUTFALL TO SILVER BEACH CREEK



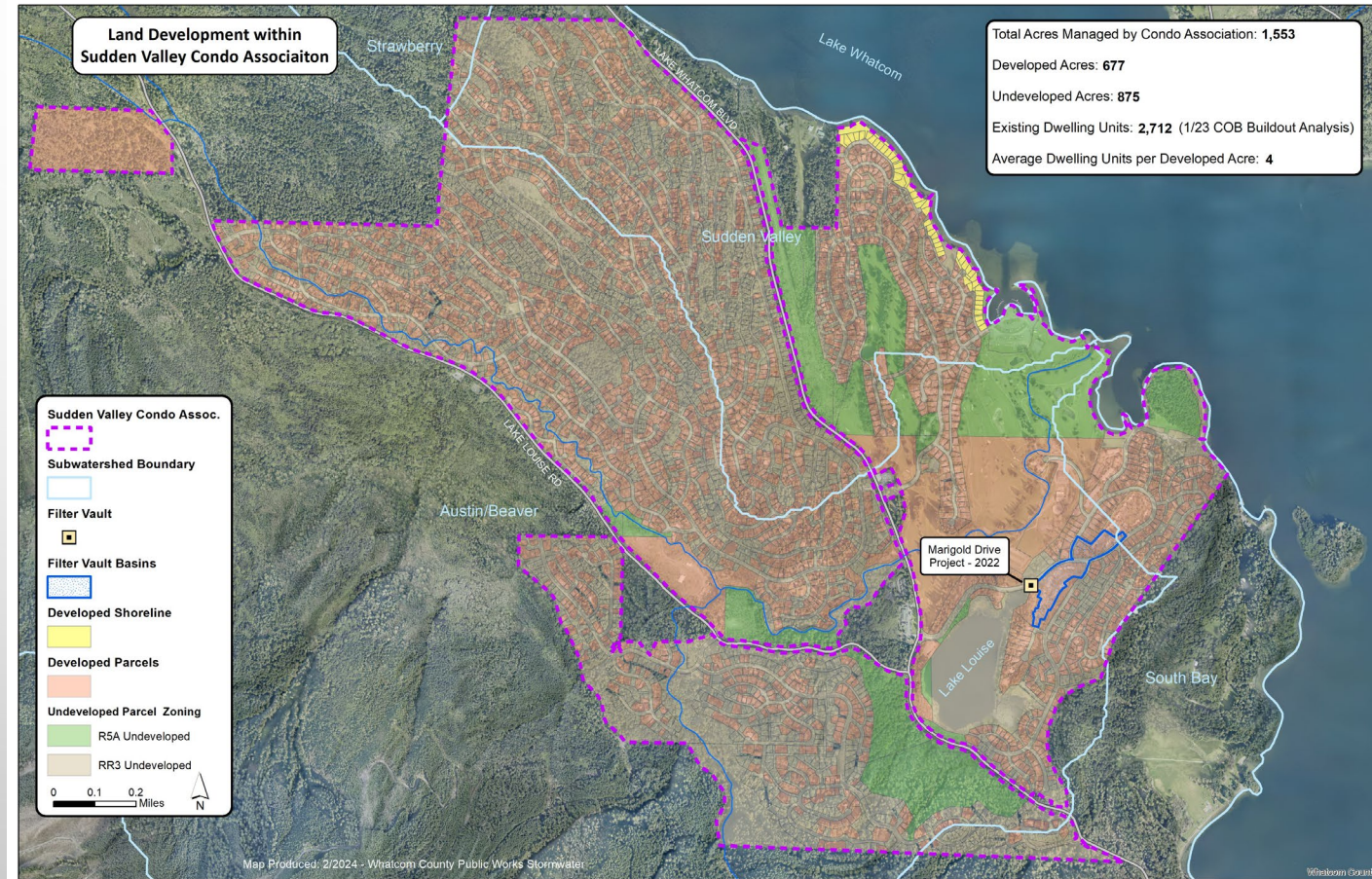
LAKE WHATCOM EAST GENEVA SUBWATERSHED MASTER PLAN (TETRA TECH 2021)

- DEVELOP AN ACCURATE, COMPREHENSIVE INVENTORY OF STORMWATER FACILITIES IN EACH OF THE SUBWATERSHED AREAS.
- CREATE A GUIDE FOR IMPLEMENTING CAPITAL PROJECTS TO ADDRESS DRAINAGE DEFICIENCIES IN A PRIORITIZED AND SCHEDULED MANNER.
- INCLUDED AND EVALUATED WATER QUALITY PROJECTS FROM THE LAKE WHATCOM COMPREHENSIVE PLAN: STORMWATER CAPITAL PROGRAM UPDATE (HERRERA, 2017).
- DEVELOP SITE-SPECIFIC OPTIONS FOR WATER QUALITY IMPROVEMENTS.
- DOCUMENT PROJECT NEEDS TO INCORPORATE INTO A COUNTYWIDE CAPITAL IMPROVEMENT PROGRAM.
- SEVERAL SMALL WORKS PROJECTS



MEMORANDUM OF UNDERSTANDING: WHATCOM COUNTY AND SUDDEN VALLEY COMMUNITY ASSOCIATION (COUNTY ADOPTION 2021)

- SUDDEN VALLEY (PRIVATE DEVELOPMENT) IS THE LARGEST DEVELOPMENT IN THE LAKE WHATCOM WATERSHED WITH OVER 7,000 RESIDENTS THAT PROVIDE A SIGNIFICANT PORTION (>50%) OF THE TOTAL COLLECTED REVENUES BY THE LAKE WHATCOM STORMWATER UTILITY.
- IMPLEMENTING TREATMENT AND BEST MANAGEMENT PRACTICES IN STORMWATER CAPITAL PROJECTS IN SUDDEN VALLEY IS CRITICAL FOR MEETING TMDL OBJECTIVES
- THE SVCA WILL GRANT PERMANENT EASEMENTS TO THE COUNTY FOR TREATMENT FACILITIES AND ALLOW ACCESS FOR INSPECTION, REPAIR, AND MAINTENANCE.
- THE COUNTY WILL COLLABORATE AND COORDINATE PROJECTS WITH SVCA'S LONG TERM CAPITAL PROGRAM.



PROJECTS COMPLETE:

MARIGOLD DRIVE STORMWATER IMPROVEMENTS (2022)

- TIGHT LINED OPEN DRAINAGE SYSTEM TO REDUCED PHOSPHORUS LOADING ENTERING THE DRAINAGE SYSTEM.
- PROVIDE CONVEYANCE CAPACITY TO REDUCE DRAINAGE ISSUES.
- REDUCED PHOSPHORUS LOADING PRIOR TO ENTERING LAKE LOUISE THROUGH THE INSTALLATION OF STORMFILTER CARTRIDGE VAULT
- IMPROVE AQUATIC HABITAT IN LAKE LOUISE BY REMOVING CONTAMINANTS PRIOR TO ENTERING THE LAKE



MAINTENANCE

➤ IMPROVING KNOWLEDGE BASE THROUGH ROUTINE MAINTENANCE.

- CARTRIDGE VAULT EVALUATION
- CONTROL STRUCTURE CLEANING
- ENHANCED SCHEDULE

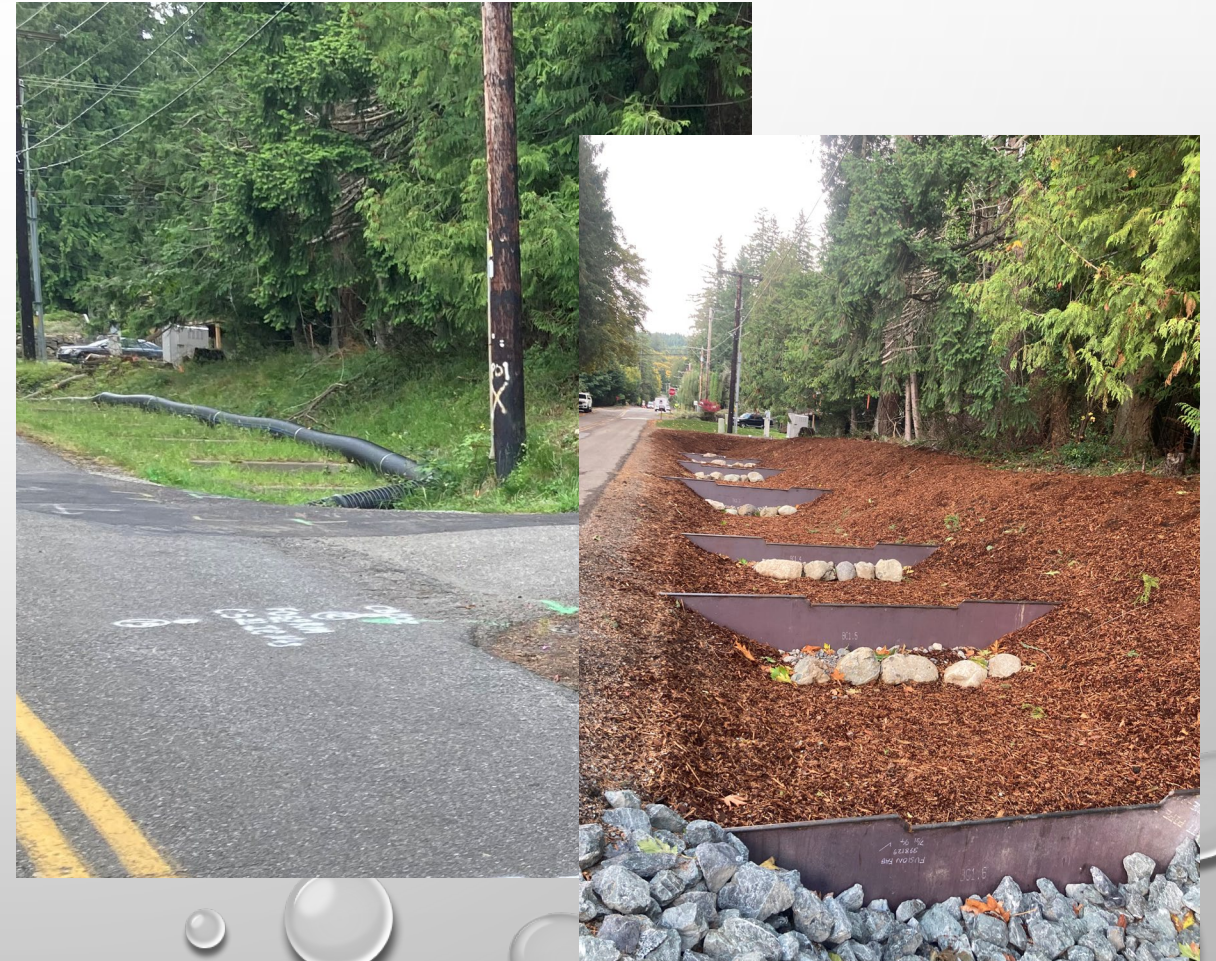


RETROFIT PROJECT PRECIPITATED FROM LESSONS LEARNED CONTINUED

2023 GENEVA BIORETENTION PILOT PROJECT

LAKE WHATCOM EAST GENEVA SUBWATERSHED MASTER PLAN

- UTILIZED EMERGING TECHNOLOGY ABSORPTIVE MEDIA TO FILTER CONTAMINATES OUT OF STORMWATER
- RECEIVED GRANT FROM DOE TO UTILIZE THIS MEDIA IN THE PROJECT
- PERFORMING 2 YEAR POST CONSTRUCTION MONITORING TO INFORM THE EFFECTIVENESS OF THE MEDIA
- COLLABORATING W/ KING COUNTY TO TEST FOR ADDITIONAL POLLUTANTS. 6PPD, HYDROCARBONS, FECAL
- USED IMPERMEABLE LINER TO HAVE THE SYSTEM SELF CONTAINED
- UTILIZED DOSING SIPHON TO ALLOW FOR MEDIA DRY OUT PERIOD



RETROFIT PROJECT PRECIPITATED FROM LESSONS LEARNED CONTINUED

2024 ACADEMY ROAD STORMWATER IMPROVEMENTS

- EXPANDED ON PRELIMINARY BASIN ANALYSIS TO MORE ACCURATELY INFORM OF CONTRIBUTING BASIN.
- EXPANDED KNOWLEDGE BASE ON EFFICACY OF MEDIA WITH DILUTED FLOWS
- FUNCTION OF TECHNOLOGIES UTILIZED WERE FURTHER UNDERSTOOD I.E. DRY OUT PERIOD



SUMMARY

Maintenance Expenses for Treatment Vaults

- 2023 MAINTENANCE EXPENSES FOR TREATMENT VAULTS
 - 24 TREATMENT VAULTS
 - TOTAL OF 262 CARTRIDGES
 - 2023 COSTS >\$150,000
 - >\$600 PER CARTRIDGE

SUMMARY

Performance consideration for Treatment Vaults

- DILUTION GREATLY AFFECTS EFFICIENCY (POUNDS OF PHOSPHORUS REMOVED) OF CARTRIDGE VAULTS.
 - SITING TREATMENT SYSTEMS REQUIRES AVOIDANCE OF THE FOLLOWING:
 - INTERCEPTING OFF SITE DRAINAGE FROM FORESTED OR UNDEVELOPED AREAS
 - INSTALLING IN EXISTING DRAINAGE SYSTEMS THAT CONVEY OFFSITE FLOWS
 - INSTALLING IN AREAS THAT RECEIVE BASE FLOW – INTERMITTENT STREAMS

SUMMARY

Performance consideration for Treatment Vaults

- CAREFUL SITING CAN INCREASE CARTRIDGE EFFICIENCY AND SAVE COSTS
 - EDGEWATER LANE CAPITAL PROJECT
 - USED TIGHT-LINE PIPE TO BYPASS CLEAN WATER AROUND THE TREATMENT VAULT
 - REDUCED COSTS (ELIMINATED THE NEED FOR MORE THAN 10 CARTRIDGES AND ASSOCIATED INSTALLATION EXPENSE)
 - INSURED THE AREA TREATED WASN'T IMPACTED BY DILUTION
 - SAVED OVER \$6000 DOLLARS/YEAR IN MAINTENANCE COSTS
 - REDUCED TOTAL AREA "TREATED" AND THEORETICAL TOTAL POUNDS TREATED

SUMMARY

2006 LW Comprehensive Stormwater Plan *Executive Summary*

Solutions

Stormwater Management Priorities

Water Quality and Phosphorus

- Control erosion in ditches and creeks, on already-developed property and construction sites
- Reduce stormwater runoff volumes and velocities
- Infiltrate stormwater to provide natural treatment
- Provide source control

Water Quantity

- Infiltrate rainfall on-site
- Minimize peak flows
- Control runoff volumes

Aquatic Habitat

- Stabilize stream channels
- Re-vegetate degraded riparian corridors

Phosphorus is difficult to remove from stormwater once it is there. Reducing phosphorus at its source through wide-reaching programmatic solutions can be more cost-effective than attempting to remove it through stormwater treatment. No single type of solution exists for any of Lake Whatcom's problems. This plan recommends a combination of different solutions to target these problems.

SUMMARY

Measurement of progress toward 50 year goal

- THE LW COMPREHENSIVE STORMWATER PLAN CREATED A GOOD OVERVIEW AND PROVIDED GOOD DIRECTION ON HOW TO PROCEED WITH WATER QUALITY IMPROVEMENT IN LAKE WHATCOM
- THE STORMWATER CAPITAL PROGRAM UPDATE (2017) TOOK ANOTHER GENERAL LOOK AT OPTIONS FOR WATER QUALITY TREATMENT PROJECTS IN LAKE WHATCOM
- THE EAST GENEVA SUB-WATERSHED MASTER PLAN (2021) IS THE FIRST IN A SERIES OF AREA SPECIFIC PLANS THAT ARE PLANNED TO PROVIDE A COMPREHENSIVE LIST OF TASKS AND PROJECTS TO IMPROVE WATER QUALITY IN LAKE WHATCOM

SUMMARY

Sub-watershed Master Plans – provide metrics of progress towards meeting 50 year goal

- SUB WATERSHED MASTERPLANS PROVIDE A DETAILED ACCOUNTING FOR NEEDED IMPROVEMENTS THROUGH:
 - SITE SPECIFIC INVENTORY OF A LIMITED AREAS – 400 – 600 ACRES OF URBAN DEVELOPMENT PLUS CONTRIBUTING BASINS
 - INCLUDE PLAN LEVEL ANALYSIS OF THE AREA HYDROLOGY AND HYDRAULIC PERFORMANCE OF THE DEVELOPED DRAINAGE SYSTEM
 - THIS ANALYSIS IDENTIFIES CONSTRAINTS IN EXISTING DRAINAGE INFRASTRUCTURE
 - PROVIDE DETAILED SITE INSPECTION/INVENTORIES TO CREATE MAPPABLE LISTED SOURCES OF NONPOINT POLLUTION
 - INCLUDES COMPLAINTS LOGGED IN SW'S COMPLAINT DATA BASE

SUMMARY

Sub-watershed Master Plans – provide metrics of progress towards meeting 50 year goal

- SUB WATERSHED MASTERPLANS PROVIDE A DETAILED ACCOUNTING FOR NEEDED IMPROVEMENTS THROUGH:
 - THE CREATION OF A WORK LIST FOR EACH SWMP AREA, IDENTIFYING NEEDED IMPROVEMENTS WHICH ARE DIVIDED INTO THE FOLLOWING CATEGORIES:
 - CAPITAL IMPROVEMENT PROJECTS
 - SMALL WORKS PROJECTS
 - MAINTENANCE PROJECTS/NEEDS
 - IDENTIFIED SPECIAL STUDY AREAS
 - INCLUDES A PRIORITIZATION METHOD TO USE IN SCHEDULING PROJECTS/ACTIVITIES

SUMMARY

Sub-watershed Master Plans – provide metrics of progress towards meeting 50 year goal

- AT LEAST 3 SWMPS ARE CONTEMPLATED FOR LAKE WHATCOM
 - EAST GENEVA – COMPLETED IN 2021
 - WEST GENEVA/HILLSDALE, TO BE INITIATED IN 2024
 - SUDDEN VALLEY – CONTEMPLATED FOR 2026/27

SUMMARY

Sub-watershed Master Plans – provide metrics of progress towards meeting 50 year goal

- SWMPS ACTIVITY LISTS CAN BE COMBINED AS THEY COME ON LINE TO BUILD AN ANNUAL WORK PLAN AND MULTI-YEAR WORK PLANS
 - PROGRESS TOWARDS MEETING THE 50 YEAR GOAL CAN BE MEASURED AGAINST THOSE LISTS AND WORK PLANS
 - WHEN THE FINAL SWMP IS COMPLETED, THE PROJECTS CAN BE COMBINED INTO A FINAL LIST AND PRIORITIZED.
 - ANNUAL REPORTS CAN REFERENCE PROGRESS TOWARD MEETING THOSE PRIORITIZED TASKS/PROJECTS
 - THE PLANS CAN INCORPORATE NEW PROJECTS/INFORMATION AS THEY BECOME AVAILABLE

SUMMARY

Sub-watershed Master Plans – provide metrics of progress towards meeting 50 year goal

- THERE IS A FINITE AMOUNT OF PROJECTS/TASKS THAT CAN BE DONE TO MEET THE REQUIREMENTS OF THE TMDL.
 - OUTREACH AND EDUCATION, MAINTENANCE OF INFRASTRUCTURE AND CONTINUING TO UPGRADE FACILITIES AS NEW TECHNOLOGIES COME ON LINE WILL EVENTUALLY BE THE PRIMARY WORK FOR THE STORMWATER DIVISION
 - IDENTIFYING, CATALOGING AND LAYING OUT WORK PLANS TO COMPLETE THE IDENTIFIED PROJECTS AND TASKS WILL BE THE FOCUS OF THE STORMWATER DIVISION FOR THE FORESEEABLE FUTURE
 - THIS WORK WILL BE GUIDED BY THE DETAILED ANALYSIS PROVIDED BY THE SWMPs AND OTHER STUDIES UNDERWAY OR CONTEMPLATED INTO THE FUTURE
 - FUTURE PROGRESS WILL BE TRACKED USING ANNUAL AND LONG TERM WORK PLANS

SUMMARY

Sub-watershed Master Plans – provide metrics of progress towards meeting 50 year goal

- NEW METRIC
 - 6 AND 10 YEAR WORK PLANS
 - 6 YEAR PLAN UPDATED ANNUALLY
 - 10 YEAR PLAN UPDATED EVERY 5 YEARS
 - SOURCE FOR 6 AND 10 YEAR PLANS
 - SWMPS
 - OTHER STUDIES
 - IDENTIFIED EMERGING PROBLEMS